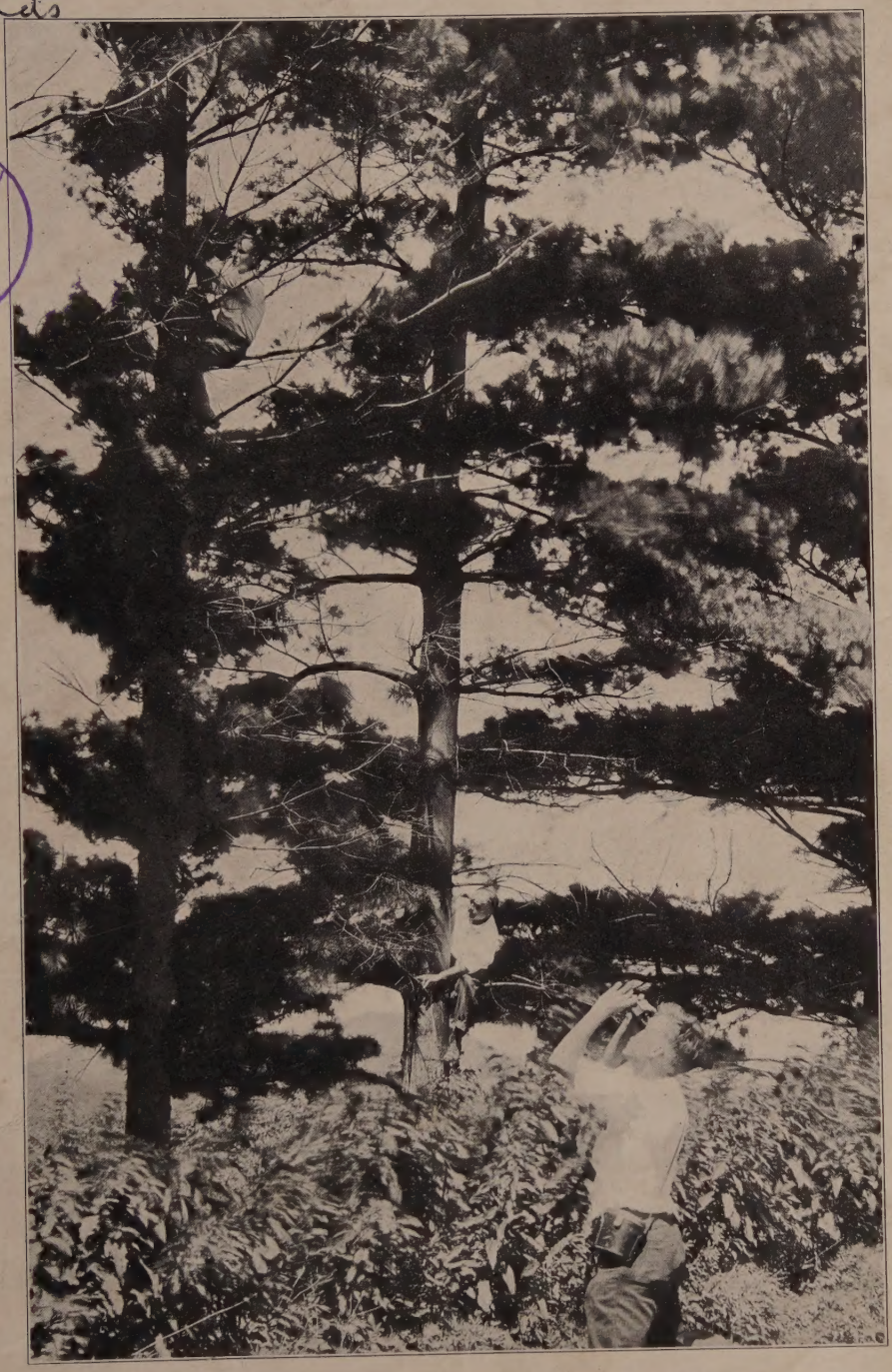
WASHBURN

Work on Pine Blister Rust in Minnesota 1917

In cooperation with the U. S. Bureau of Plant Industry.

BRIT. MUS. (N.H.) ENTOMOLOGY



Intensive Inspection of Large Pines is Not Practical, but in this case it was thought advisable, since these Trees formed part of a wind-break near a large planting of White Pine in a nursery.

SPECIAL REPORT OF THE STATE ENTOMOLOGIST
TO THE GOVERNOR

CIRCULAR No. 45. DEC. 1, 1917

WORK ON PINE BLISTER RUST IN MINNESOTA, 1917

IN COOPERATION WITH THE
U. S. BUREAU OF PLANT INDUSTRY

Special Report of the State Entomologist
To The Governor

CIRCULAR 45, DECEMBER 1, 1917

UNIVERSITY FARM
ST. PAUL

STATE OF MINNESOTA, ENTOMOLOGIST'S OFFICE

Agricultural Experiment Station

St. Paul, Minn., Dec. 1, 1917.

His Excellency,
J. A. A. Burnquist,
St. Paul, Minnesota.

Dear Sir:

I take pleasure in presenting you herewith a brief report of Work on the Pine Blister Rust in Minnesota during the season of 1917, in co-operation with U. S. Bureau of Plant Industry.

Yours respectfully,
F. L. WASHBURN,
State Entomologist.

WORK ON PINE BLISTER RUST IN MINNESOTA, 1917*

CONDITIONS IN 1916 BRIEFLY OUTLINED.

A full account of conditions and work in 1916 may be found in the Entomologist's Special Report to the Governor on Blister Rust Work for 1916, printed November 15, 1916.

1. Disease first found in May, 1916, on pines in a nursery in the St. Croix Valley near Taylors Falls on trees brought from the nursery in St. Croix Falls, Wisconsin. The latter nursery obtained these trees in one or two shipments, coming through an Illinois firm from Germany, in 1908 or 1909 or in both years. It should be borne in mind that inasmuch as this disease may be on pine and yet be concealed for a number of years a certificate granted by the State Entomologist to a nurseryman can be absolutely no guarantee that this disease does not exist in his nursery.

2. On June 4th the disease was discovered on pines approximately eighteen years old in a nursery about 40 miles south of the above locality. On July 20th it was found on currants in this nursery seventy-five feet from the above pines. Both of these nurseries were quarantined as regards shipments of five leaf pines, currants and gooseberries, until stock of this kind present in the nursery had been eradicated.

3. On July 14th two experts, employed by the State Entomologist, scouting along the St. Croix River discovered the disease on Ribes (both currants and gooseberries), at Dry Creek, about six miles above Taylors Falls, in a large stand of pine, much of which was of merchantable size.

4. September 25, 1916, it was found in the course of a survey of the St. Croix River on Ribes at a point known as Pine Hollow, three miles below Osceola on the Minnesota side. Here the pines were much smaller than those at Dry Creek.

5. Two emergency appropriations were secured for the use of the Entomologist aggregating $1,300.

6. During the summer a complete survey was made on the Minnesota side from twelve miles above Taylors Falls to a point below Stillwater with results as above outlined.

7. Systematic inspection of all nurseries carrying pine was started early in the season, a second inspection covering pines, currants and gooseberries being made later in the season.

8. In addition to the $1,300 emergency appropriation on the part of the State, $1,026.22 was expended from the regular appropriation of the State Entomologist, which would normally be applied to Nursery Inspection. Approximately $1,200 was expended on this work by the U. S. Bureau of Plant Industry, and small sums from the Division of Plant Pathology of the Experiment Station and from the Minnesota Forestry Service.

*Nursery and Orchard Inspection and White Pine Blister Rust are Experiment Station projects, authorized by the director, an d hence represent University work.

BLISTER RUST INFECTIONS FOUND IN 1916

Town or Township	County	Number and Species Infected	Source of Trees	Reached Aecial Stage?	Date Found	By Whom Found	Eradication
Dry Creek about 6½ miles above Taylors Falls	Chisago A mile or so from St. Croix River	Several Acres of Ribes	Native	.....	7-14-16	Jenson and Reynolds	Ribes eradicated from infected area and fifteen hundred feet beyond. See 1917 Eradication table.
Ghent	Lyon	One Pinus strobus	Infected Nursery	No, but Pycnia present	In 1916	Rose	Destroyed entire shipment.
Lakeland	Washington	Several Pinus strobus, one flexilis and one cembra. Few currants slightly infected	Unknown	Yes	6-4-16 6-20-16	Peake & Conzet Freeman & Pierce	All pines and ribes in Nursery were destroyed.
Pine Hollow Creek	Chisago	Several Acres of Wild Ribes	Native	.....	9-25-16	Coe & Salmon	See 1917 Eradication Table.
Taylors Falls	Chisago	Several white pines Few Wild Ribes near Nursery	Infected Nursery St. Croix Falls, Wis.	Yes	May 24, 1916	Stakman, Peake & Freeman Freeman	All pines and ribes in Nursery destroyed
Long Lake	Hennepin	Pinus strobus	Infected Nursery	.....	6-2-16	D. M. Badger	All pines burned 6-5-16

Fig. 1. A characteristic specimen of 1917 fruiting on twig of pine; lead from nursery. Whitish areas on twig are due to presence of pine louse.

CONDITIONS AT OPENING OF SEASON OF 1917.

At the 40th session of the Minnesota Legislature convening during the winter of 1916-17, the passage of a law was secured (as an amendment to the already existing inspection law), intended to enable the Entomologist to handle the blister rust situation and other similar emergencies. The text of this amendment is here given.

Section 1-A. When any tree, shrub or plant, not itself diseased or infested, which is a host for any organism inducing a plant disease, new to or not heretofore widely prevalent or distributed within or throughout this state, or host for any destructive insect, new to or not heretofore widely prevalent or widely distributed throughout this state is situate within three thousand feet of any tree, plant or shrub which is infested with any such organism or insect, the State Inspector of Nurseries may for the purpose of preventing the spreading of such organism or insect, cause such tree, plant or shrub not itself so diseased or infested, to be destroyed as hereinafter provided:

(A) No tree, plant or shrub not itself diseased, shall be ordered destroyed without the approval in writing of the order therefor signed by a majority of a committee consisting of the Experiment Station Entomologist, President of the Minnesota Horticultural Society and the Director of the Minnesota Agricultural Experiment Station and by the Plant Pathologist of the Minnesota Agricultural Experiment Station if a plant disease is concerned, or without opportunity being given to owner of such trees, plants or shrubs for an open hearing if he objects to such action on the part of the Inspector.

(B) When the destruction of any such trees, plants, or shrubs is determined upon, the State Inspector of Nurseries shall by notice in writing, approved as provided for in Subdivision "A" of this section, direct the owner or lessee of the land on which such plants, trees or shrubs are situate to destroy as many of such plants as the State Inspector may deem necessary, within such period of time as shall be therein specified, provided, however, such tree, plant or shrub shall not be required to be destroyed until the value thereof shall have been appraised as hereinafter provided.

(C) Immediately upon the issuance by the State Inspector of Nurseries of an order for the destruction of any trees, plants or shrubs, other than trees especially valuable for lumber, he shall designate three or more persons to be selected from the list of appraisers hereinafter provided for in Subdivision H of this section, to appraise the value of such trees, plants or shrubs.

(D) In case the order issued by the State Inspector of Nurseries directs the destruction of any tree, or trees, chiefly valuable for timber purposes, the same shall be appraised as hereinafter provided for by the State Forester, the Assistant State Forester or such suitable employe of the State Forester's department as shall be designated in writing by the State Forester.

(E) It shall be the duty of the appraisers so appointed to forthwith take and subscribe an oath to fairly and honestly determine the value of the trees, plants or shrubs so ordered to be destroyed and determine the fair cash value thereof at the place and in the condition the same may be in at the time of the issuance of the order. The appraisers so appointed shall receive as compensation for their services such sum, not to exceed six dollars per day, as shall be fixed by the State Inspector of Nurseries, for each day necessarily employed in the performance of their duties, together with the necessary traveling expenses and hotel bill, incurred in the performance of their duties, provided, however, that no officer or employe of the state shall receive any compensation for the performance of the duties herein imposed, but shall be reimbursed for his actual and necessary expenses. Such compensation and expenses, when approved by

the State Inspector of Nurseries shall be audited and paid by the State Auditor from the appropriation made for the purposes of this act.

(F) The appraisers so appointed shall forthwith give notice to the owner or lessee of the land on which the trees, plants or shrubs ordered to be destroyed are situate of the time when they will visit the premises for the purpose of making their appraisal. Such owner or lessee shall at the time so specified, be given a full opportunity to be heard on the question of the value of the trees, plants and shrubs so ordered to be destroyed. The appraisers shall thereupon determine, as hereinbefore provided, the cash value of such trees, plants and shrubs and make and file with the State Inspector of Nurseries a report in duplicate of their appraisal and shall also give a copy thereof to the owner or lessee. The said reports shall each be signed by the appraiser. One of the copies thereof filed with such inspector shall be attached to a voucher, which voucher after approval by the State Inspector of Nurseries, shall be transmitted to the State Auditor for audit and after allowance by him the amount therein specified shall be paid from the money appropriated for the purposes of this act, to the owner of the trees, plants or shrubs ordered to be destroyed. The State Inspector of Nurseries shall attach to the voucher approved by him a certificate that the trees, plants and shrubs so appraised and specified in the voucher and appraisal have been destroyed in accordance with the order. The oath of the appraisers hereinbefore specified shall be attached to and filed with the copy of the appraisers' report filed with the State Inspector of Nurseries.

(G) Upon the delivery to him of the appraisers' report the owner or lessee of the land on which the trees, plants or shrubs ordered to be destroyed are situate, shall forthwith destroy the same in the manner directed by the State Inspector of Nurseries, and within the time as specified in Subdivision B, and any owner or lessee who fails so to do within a period of five days after the expiration of said time specified in subdivision B shall be guilty of a felony and in addition to such criminal liability, the State Inspector of Nurseries may, after the failure of the owner or lessee for said five days to so destroy the same, cause the said trees, plants or shrubs to be destroyed at the expense of the owner, in the manner and as provided for in Section 1 of this act, and such expense in such case shall be deducted from the amount payable to the owner. Provided that said owner, lessee or representative shall not be guilty of felony if within five days after receiving the notice for the destruction of such trees, plants and shrubs as provided for in subdivision B he shall notify said State Inspector of Nurseries in writing that he prefers to have said State Inspector of Nurseries destroy such trees, plants and shrubs as provided in this section.

(H) It shall be the duty of the Executive Board of the State Horticultural Society and the Director of the Experiment Station each to furnish to the State Inspector of Nurseries a list of five practical horticulturists residing in several parts of the state who possess knowledge of the value of trees, plants and shrubs, from each of which the appraising committee is chosen.

(I) The State Inspector of Nurseries is hereby authorized and empowered to prohibit by proclamation the importation into this state of any plant, tree or shrub which has been grown or propagated in any state, province or county or in any place where it shall be determined by the said State Inspector of Nurseries after due investigation, that there exists and is prevalent to a dangerous extent, White Pine Blister Rust or any other plant disease or destructive insect new to Minnesota which is liable to or capable of spreading to and infecting the plants, trees and shrubs of this state and which may be carried and transported to and into this state on or in trees, plants and shrubs there grown. It shall be the duty of said State Inspector of Nurseries upon the making and promulgation by him of any such proclamation to forthwith mail a copy

thereof to each certified nurseryman and to each railroad company doing business in this state and to publish a copy thereof in a newspaper published at the City of Duluth and at the City of St. Paul, and any person, firm or corporation or common carrier which shall after thirty days from the reception of said notice, introduce or transport into this state any tree, plant or shrub grown or propagated in the territory described in such proclamation, shall be guilty of a gross misdemeanor and in case the offender be a corporation, shall be punished by a fine of not less than five hundred or more than one thousand dollars for each shipment so introduced into this state.

An appropriation of $15,000 for the biennium was also granted by the Legislature.

The generous financial co-operation of the U. S. Bureau of Plant Industry was secured and the work in Minnesota this season has been done by the Plant Pathologist of the Experiment Station, the State Entomologist and the above-named Bureau, whose Agent, Mr. R. G. Pierce, has been in the state directing and advising at frequent intervals during the summer and fall. Specimens of pine regarding which any doubt existed were sent to Mr. R. H. Colley, of the Bureau of Plant Industry, who made many identifications, and who by his promptness and general interest has done much to help our work. At the suggestion of the Director of the Experiment Station the Plant Pathologist took charge of survey and eradication in the St. Croix valley and the Entomologist was responsible for the same work in connection with nurseries, leads from nurseries, parks, cemeteries, plantations and private plantings over the state, as well as the survey work outside the St. Croix valley. The word "lead" is used to indicate a shipment of pines from an infested nursery. An inspection of these shipments and of "leads" from "leads" has entailed on the inspection force an enormous amount of work, and is still going on as this report is made up. At the time this division of the work was agreed to, the expression "St. Croix valley" was intended to indicate the small restricted area close to the river wherein certain very serious infections were known to occur, and where most intensive work was called for. Later as the area of infection was found to be farther reaching than was at first supposed, the St. Croix district, over which work Dr. E. M. Freeman, Plant Pathologist, had complete charge, was enlarged to include all neighboring counties or parts of counties whose waters drained into the St. Croix. Of necessity, in accordance with the state law, the Plant Pathologist was made a deputy of the State Entomologist in that area.

It was upon the basis of this Division of the work that an agreement was drawn up by the U. S. Bureau of Plant Industry and signed by official representatives of that Bureau, by the State Entomologist and the Director of the Minnesota Experiment Station, under which agreement the Plant Pathologist was to have a certain amount of the State Entomologist's special appropriation for the work in the St. Croix valley. The U. S. Bureau of Plant Industry agreed to aid the Entomologist by furnishing a corresponding sum as well as additional support for his work over the state at large. It is perhaps unneces-

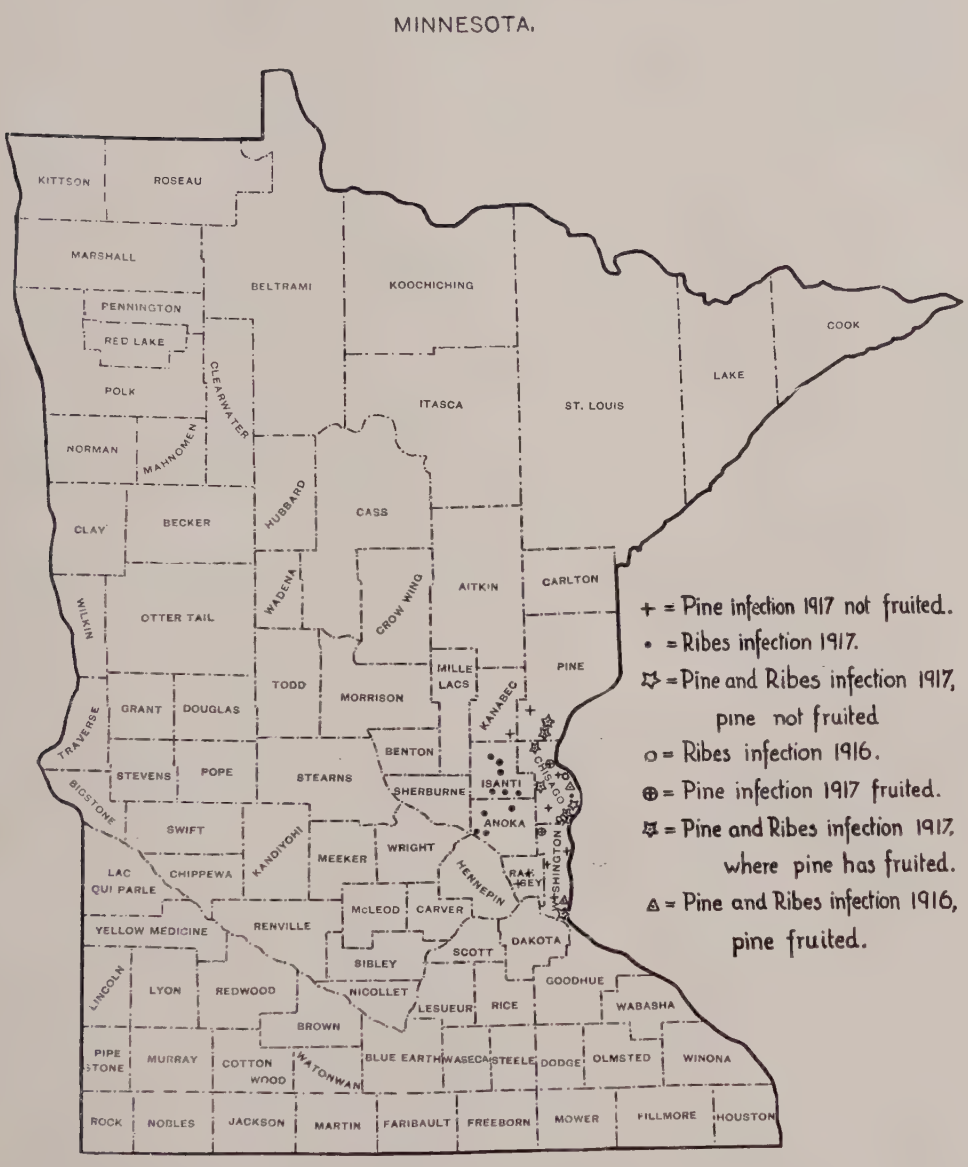


Fig. 2. Map showing known infections within the scouted area, 1917.

sary to state that the Bureau more than lived up to its agreement, furnishing, in its efforts to push the work in Minnesota, a sum much in excess of that originally agreed to. For particulars see financial statement at the end of this report. The only objection to such an agreement lies in the fact that neither party can foresee beforehand, in a work of this nature, what unlooked for exigencies and needs may arise during the season's work. The allusion in this report to the "Inspection Force" refers to the Chief Deputy and deputies under the supervision of the State Entomologist.

An average of from eight to eleven men constituted our working force of deputies in the field during the summer. The force in the St. Croix district under the Plant Pathologist of the Experiment Station numbered in the early summer eleven men. That number was increased materially at times during the season and fifteen lumberjacks were employed to do the cutting at Dry Creek.

The organization of the State Entomologist's force for this work should receive brief comment. A field office, in charge of Mr. George W. Peake, Chief Deputy, was established in which a large collection of county and state maps were filed, as well as township maps of infested areas. There are also files for all "leads," for nurseries, for infections, for photographs, as well as individual files covering each man's work. Information regarding any feature of the work was thus immediately forthcoming at any time. Men in the field were directly under the field office, the field office being responsible to the State Entomologist.

NEW INFECTIONS DISCOVERED BY INSPECTION FORCE IN 1917.

The following list is to be supplemented by the infections discovered by deputies working in the St. Croix district under Mr. Bartelt, representing the Station Plant Pathologist. For list of these latter infections see that part of this report which deals with work in the St. Croix district, page 22.

With the exception of two infected leads and the finding of one infected pine seedling in a nursery far south of the infested area, and far south of our pine belt, this disease has not been found in Minnesota to date west of the Mississippi. This is by no means to be regarded as a guarantee that it does not exist west of the Mississippi, and a large number of "leads" recently listed with us from the books of a 1916 infested nursery calling for most intensive inspection next season promises the possibility of finding the disease in one or more of the localities to which these "leads" call us. The leads and single tree above referred to have been destroyed, and the nursery quarantined as to shipments of white pine.

WHITE PINE BLISTER RUST INFECTIONS FOUND BY DEPUTIES WORKING UNDER STATE ENTOMOLOGIST DURING THE YEAR 1917. November 1, 1917

Town or Township	County	Number and Species Infected	Source of Trees	Reached Aecial Stage?	Date Found	By Whom found	Eradication Work
Anoka	Anoka	Several cultivated currants	.....	.....	9-5-17	Bushnell	Destroyed block of currants in which infection was found. Many ribes in vicinity.
Anoka Twp.	Anoka	Few red currants (cultivated)	.....	.....	8-31-17	Bushnell	Burned entire planting. Wild ribes numerous in vicinity.
Bethel	Anoka	Few black currants	.....	.....	9-7-17	Hertig	Burned his 12 black currant bushes.
Burns Twp.	Anoka	One wild gooseberry	.....	.....	8-28-17	Bushnell	Burned infected bush. No wild ribes within a half-mile radius. Few cultivated ribes.
Cambridge	Isanti	One currant, 4 currants	.....	.....	8-30-17 9-4-17	Bjorka Bjorka	Destroyed.
Chisago City	Chisago	One Pinus strobus	Infected Nursery	No	7-6-17	Hertig	Destroyed all ten pines which came from Strand in '14.
Forest Lake	Washington	One Pinus strobus	Infected Nursery	Apparently	5-7-17	Hertig	Destroyed the 15 white pines which came from May's.
Isanti	Isanti	One wild Ribes	.....	.....	8-29-17	Hertig	5½ miles east of Isanti. Destroyed infected bush.
Isanti	Isanti	One wild Ribes	.....	.....	8-28-17	Hertig	Destroyed infected bush.
Isanti	Isanti	Four black currants	.....	.....	8-16-17	Bjorka	Destroyed four infected bushes.
Isanti	Isanti	Few black currants	.....	.....	8-13-17	Hertig	Uredo stage. Destroyed diseased bushes.
Isanti	Isanti	One red currant	.....	.....	8-16-17	Hertig	Destroyed infected bush.
Isanti	Isanti	One gooseberry bush	.....	.....	8-28-17	Hertig	4½ miles east of town. Infected bush destroyed.
Isanti	Isanti	One black currant	.....	.....	8-20-17	Hertig	Two miles east of Isanti. Eradicated and burned ribes along the road 200 yds. each side of the infection.
Isanti	Isanti	One red currant	.....	.....	8-13-17	Hertig	Uredo with beginning telio stage. Burned all ribes.

WHITE PINE BLISTER RUST INFECTIONS FOUND BY DEPUTIES WORKING UNDER STATE ENTOMOLOGIST DURING THE YEAR 1917—Cont. November 1, 1917.

Town or Township	County	Number and species infected	Source of Trees	Reached aecial stage?	Date found	By whom found	Eradication Work
Isanti	Isanti	One cultivated bush	.....	.....	8-24-17	Hertig	Destroyed all cultivated Ribes.
		One gooseberry bush	.....	.....	8-28-17	Hertig	Destroyed infected bush.
Lake Vadnais	Ramsey	One Pinus strobus	Infected Nursery	No	5-22-17	Clapp	All pines from infected Nursery pulled and burned. Wild Ribes eradicated within a full-mile radius. 4886 pines destroyed. Cultivated Ribes not destroyed.
		One Pinus strobus	.....	No	6-29-17	Somes	
		One Pinus strobus	.....	No	5-15-17	Clapp	
Mahtomedi	Washington	Four Pinus strobus	Infected Nursery 1914	No	10-17-17	Clapp	Destroyed the ten white pines which were from infected Nursery.
Minneapolis	Hennepin	Two Pinus strobus	Infected Nursery 1915.	No	8-9-17	Abbott	Destroyed 3 white pines remaining of original shipment.
North Branch	Chisago	Cultivated Ribes	.....	.....	8-17-17	Bushnell	35 acres eradicated of Ribes.**
North Branch	Chisago	Cultivated Ribes	.....	.....	8-15-17	Bushnell	
North Branch	Chisago	Cultivated Ribes	.....	.....	8-16-17	Bushnell	
North Branch	Chisago	Wild Ribes	.....	.....	7-30-17	Bushnell	
		Wild Ribes	.....	.....	9-10-17	Bushnell	
North Branch	Chisago	Cultivated Ribes	.....	.....	8-16-17	Bushnell	35 acres ribes eradicated. **
North Branch	Chisago	Four Pinus strobus	Infected Nursery 1914	Yes	7-4-17	Bushnell & Hertig	35 acres of Ribes eradicated. 10 pines which were from infected Nursery were destroyed. **
Owatonna	Steele	One Pinus strobus	Illinois Nursery	No	5-25-17	Somes	Destroyed infected tree. Kept at least one man scouting in the vicinity throughout summer and early fall.
St. Paul	Ramsey	One Pinus strobus	Vicinity of Amery, Wis.	No	6-1-17	Peake	Destroyed his ten white pine trees.

**Part of eradication work done by Deputies working under Dr. Freeman.

Fig. 3. Deputies of State Entomologist inspecting white pine in nursery.

QUARANTINES ESTABLISHED BY THE STATE ENTOMOLOGIST IN 1917 AND QUARANTINE ORDER NO. 26, EFFECTIVE JUNE 1, 1917, ISSUED BY THE FEDERAL HORTICULTURAL BOARD.

On April 21, 1917, the Minnesota Entomologist issued the following quarantine order prohibiting the entrance into Minnesota of all five leaf pines from certain quarantined states.

STATE OF MINNESOTA.
OFFICE OF STATE ENTOMOLOGIST.
QUARANTINE NOTICE NO. I—WHITE PINE BLISTER RUST.

The fact having been determined by the Federal Horticultural Board, the Bureau of Plant Industry and state authorities that a dangerous plant disease, known as White Pine Blister Rust, exists in the States of Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Pennsylvania, Ohio and Wisconsin, affecting white pine, limber pine, stone pine and all other five-leaf pines, and since we are endeavoring to stamp out this disease in the limited area in which we believe it occurs at this time in Minnesota, and since it may be introduced into Minnesota through shipments of nursery stock of the above varieties from Infected States, an absolute quarantine is hereby established prohibiting the shipment into Minnesota from the above named states, of any and all species of five-needled pines.

Until further notice the foregoing quarantine shall become and be effective on and after April 30th, 1917.

This quarantine is established under the authority conferred on the State Entomologist by the amendment to Chapter 206, Laws of 1913, said amendment having been passed by the State Legislature at its Fortieth Session.

F. L. WASHBURN,
State Entomologist.

April 21, 1917.

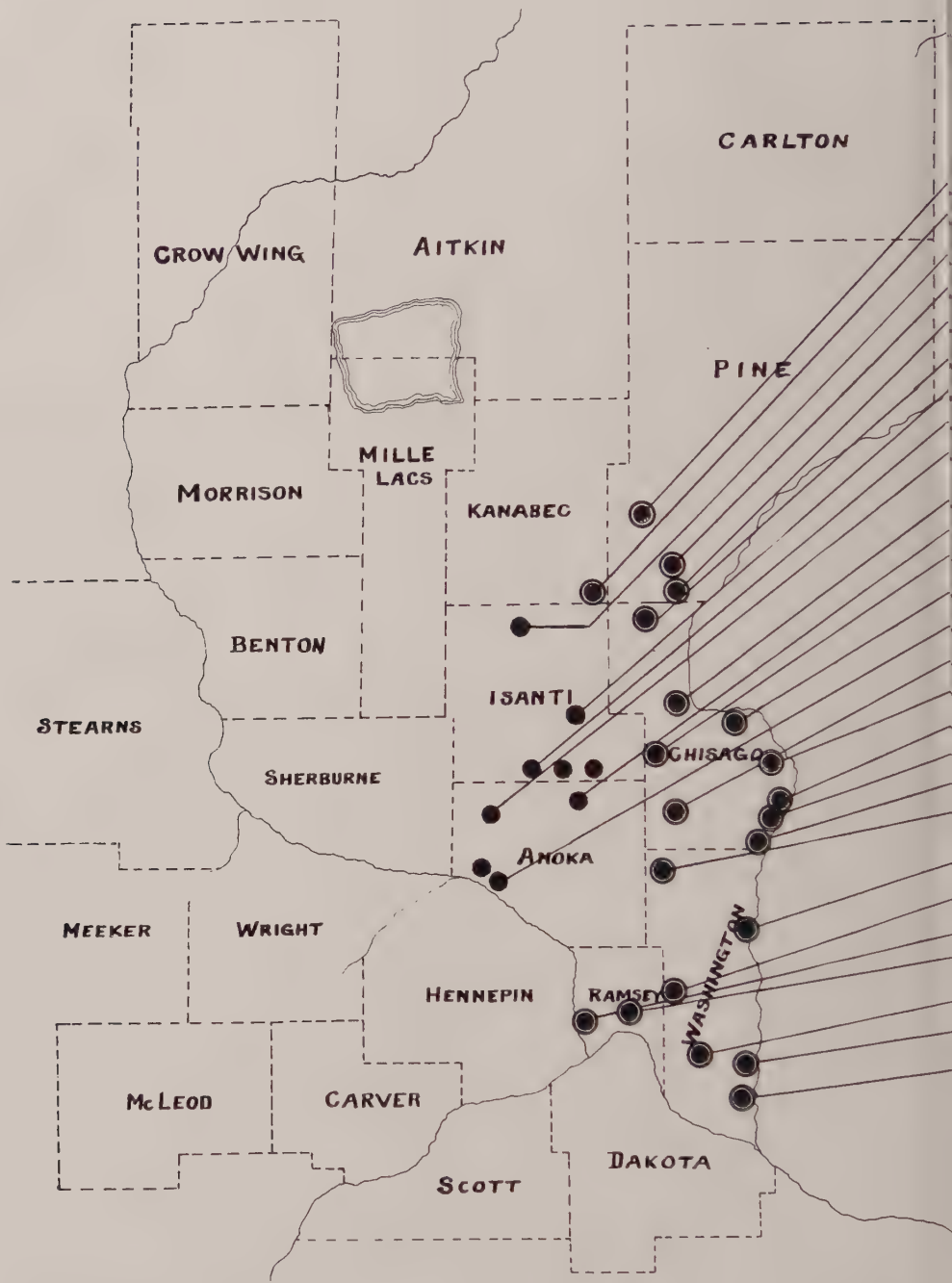
This was followed by a second quarantine notice, June 12, 1917, prohibiting entrance into Minnesota of currants and gooseberries from certain designated states.

STATE OF MINNESOTA.
OFFICE OF THE STATE ENTOMOLOGIST.
QUARANTINE NOTICE NO. 2—WHITE PINE BLISTER RUST.

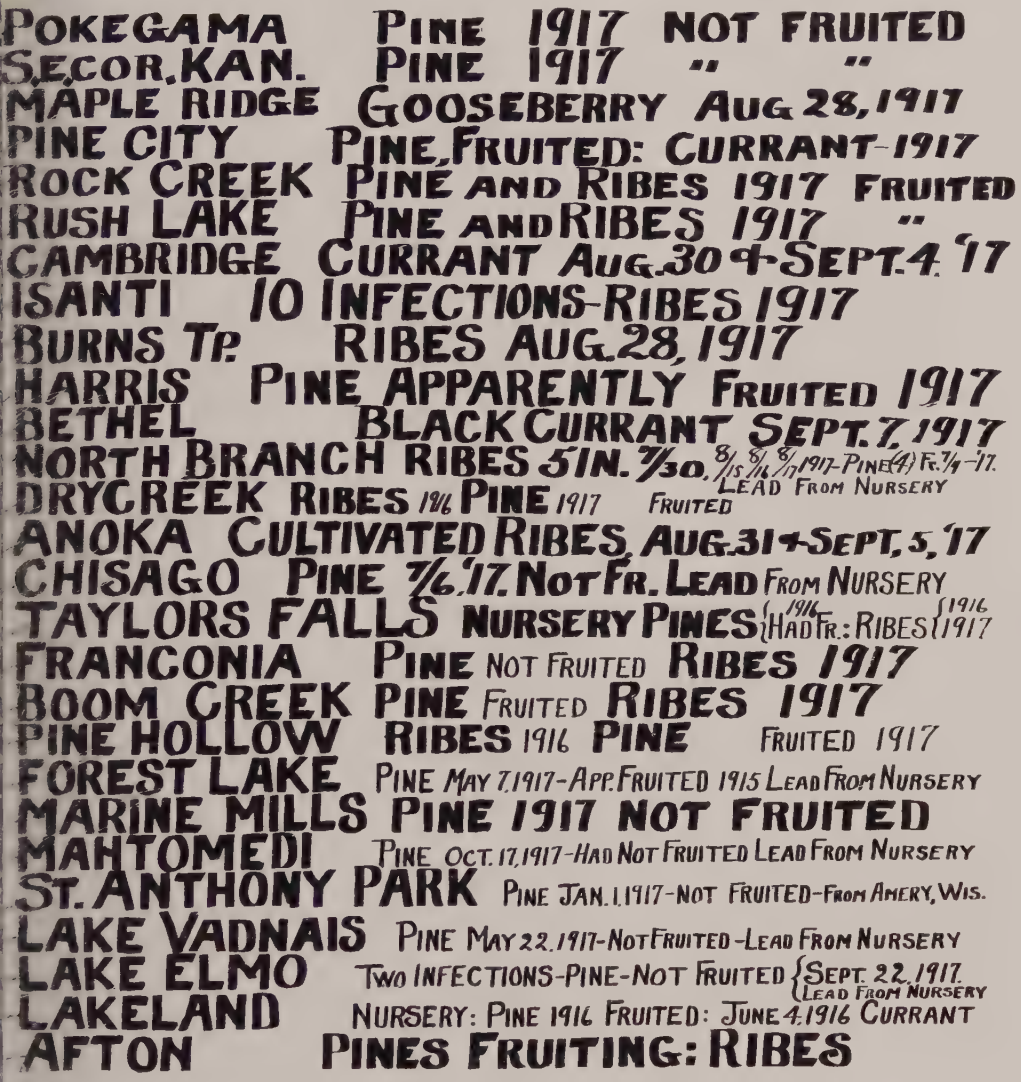
On April 21st quarantine was issued from this office against the introduction of white pine (P. strobus), stone pine (P. cembra), limber pine (P. flexilis), and any and all five-leaf pines from the states of Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Pennsylvania, Ohio and Wisconsin. This quarantine was effective on and after April 30, 1917. Inasmuch as the white pine blister rust has been discovered in the State of Michigan, the State of Michigan is now declared included in the list of above quarantined states.

The State Entomologist under the authority conferred upon him by amendment to Chapter 206, Laws of 1913, said amendment having been passed by the State Legislature at its Fortieth Session, does also hereby declare a quarantine against the entrance into Minnesota of all gooseberries and currants, referred to as Ribes and Grossularia, from

Fig. 4. Entomologist's deputies inspecting Ribes in nursery for Pine Blister Rust.



All known Minnesota infections to date, Nov. 22, 1917. The map does not show tw


POKEGAMA PINE 1917 NOT FRUITED
S.E.COR.KAN. PINE 1917 " "
MAPLE RIDGE GOOSEBERRY AUG. 28, 1917
PINE CITY PINE, FRUITED: CURRANT-1917
ROCK CREEK PINE AND RIBES 1917 FRUITED
RUSH LAKE PINE AND RIBES 1917 "
CAMBRIDGE CURRANT AUG. 30 & SEPT. 4. '17
ISANTI 10 INFECTIONS-RIBES 1917
BURNS TP. RIBES AUG. 28, 1917
HARRIS PINE APPARENTLY FRUITED 1917
BETHEL BLACK CURRANT SEPT. 7, 1917
NORTH BRANCH RIBES 5 IN. 7/30. 8/15 8/16 8/17 1917-PINE(4) FR. 7/4-17. LEAD FROM NURSERY
DRY CREEK RIBES 1916 PINE 1917 FRUITED
ANOKA CULTIVATED RIBES, AUG. 31 & SEPT. 5, '17
CHISAGO PINE 7/6.'17. NOT FR. LEAD FROM NURSERY
TAYLORS FALLS NURSERY PINES {1916 HAD FR.: RIBES {1916 1917
FRANCONIA PINE NOT FRUITED RIBES 1917
BOOM CREEK PINE FRUITED RIBES 1917
PINE HOLLOW RIBES 1916 PINE FRUITED 1917
FOREST LAKE PINE MAY 7, 1917-APP. FRUITED 1915 LEAD FROM NURSERY
MARINE MILLS PINE 1917 NOT FRUITED
MAHTOMEDI PINE OCT. 17, 1917-HAD NOT FRUITED LEAD FROM NURSERY
ST. ANTHONY PARK PINE JAN. 1, 1917-NOT FRUITED-FROM AMERY, WIS.
LAKE VADNAIS PINE MAY 22, 1917-NOT FRUITED-LEAD FROM NURSERY
LAKE ELMO TWO INFECTIONS-PINE-NOT FRUITED {SEPT. 22, 1917. LEAD FROM NURSERY
LAKELAND NURSERY: PINE 1916 FRUITED: JUNE 4, 1916 CURRANT
AFTON PINES FRUITING: RIBES
● = RIBES INFECTION ALONE
◉ = PINE INFECTION WITH OR WITHOUT RIBES INFECTION
MINN. STATE ENTOMOLOGIST DEP.

leads and one infection in nursery, also destroyed, west of the Mississippi River.

any and all of the above mentioned states, said quarantine to be effective on and after July 15th, 1917.

ANY PERSON OR CORPORATION who brings into the State or who sells or offers for sale within the State of Minnesota pines, currants or gooseberries in violation of this quarantine order will be liable to prosecution under the state law. All expenses included in deporting or destroying such shipments shall be paid by the consignor or owner.

F. L. WASHBURN,
State Entomologist.

June 12, 1917.

Federal Quarantine No. 26, effective June 1, 1917, prohibited interstate movement of five leaf pines, currants and gooseberries west of the western boundary of Minnesota, Iowa, Missouri, Arkansas and Louisiana, also prohibiting movement of five leaf pines and black currants interstate to points outside the area comprising the states of Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut and New York. An amendment to this quarantine had the effect of exempting New York from the effects of the quarantine during May, 1917.

The Federal Board has a list of all Minnesota nurserymen and was requested by the State Entomologist to send notices of these quarantines to each and every nurseryman in this state. In any state in which a quarantine was issued affecting Minnesota nurserymen the proper official was asked to advise our nurserymen of said quarantine and of laws affecting their trade with the states in question.

NURSERY INSPECTION FOR THE BLISTER RUST.

About one hundred forty-three nurseries were inspected by deputies for evidences of blister rust on pine or Ribes. Many of these nurseries were visited twice by the inspectors and some of them three times. The first inspection early in the season covered the pines and the second inspection later in the season covered both pines and currants and gooseberries. The second inspection was made of the pines, because the disease might not be apparent at one time and yet show up from four weeks to two months later. This latter fact explains why a certificate granted in the regular nursery inspection cannot be a guarantee of freedom from blister rust.

"LEADS."

Inspection of "leads" from 1916 infected nurseries has constituted a large amount of the season's work. The law quoted on previous pages allowed deputies to destroy stock actually diseased. Destruction of stock suspected of being diseased, or of susceptible stock located within a certain distance of diseased stock, while legally possible, entailed so much official action and delay

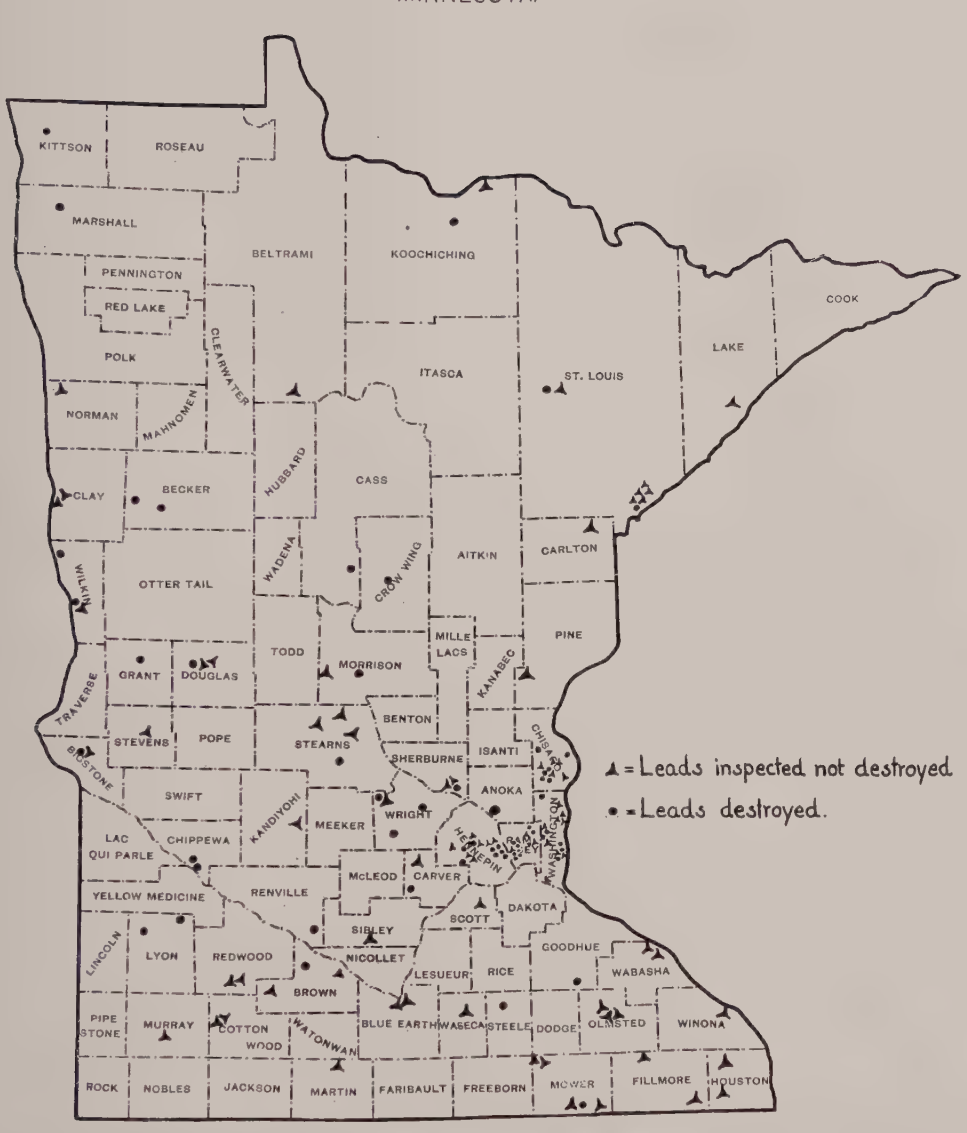


Fig. 5. Showing leads examined by inspection force and leads destroyed. It is to be noted that it is impossible, on map of this size, to show all leads; for example, Ramsey County contains 54 leads, destroyed and not destroyed. In Washington County there were 21 leads.

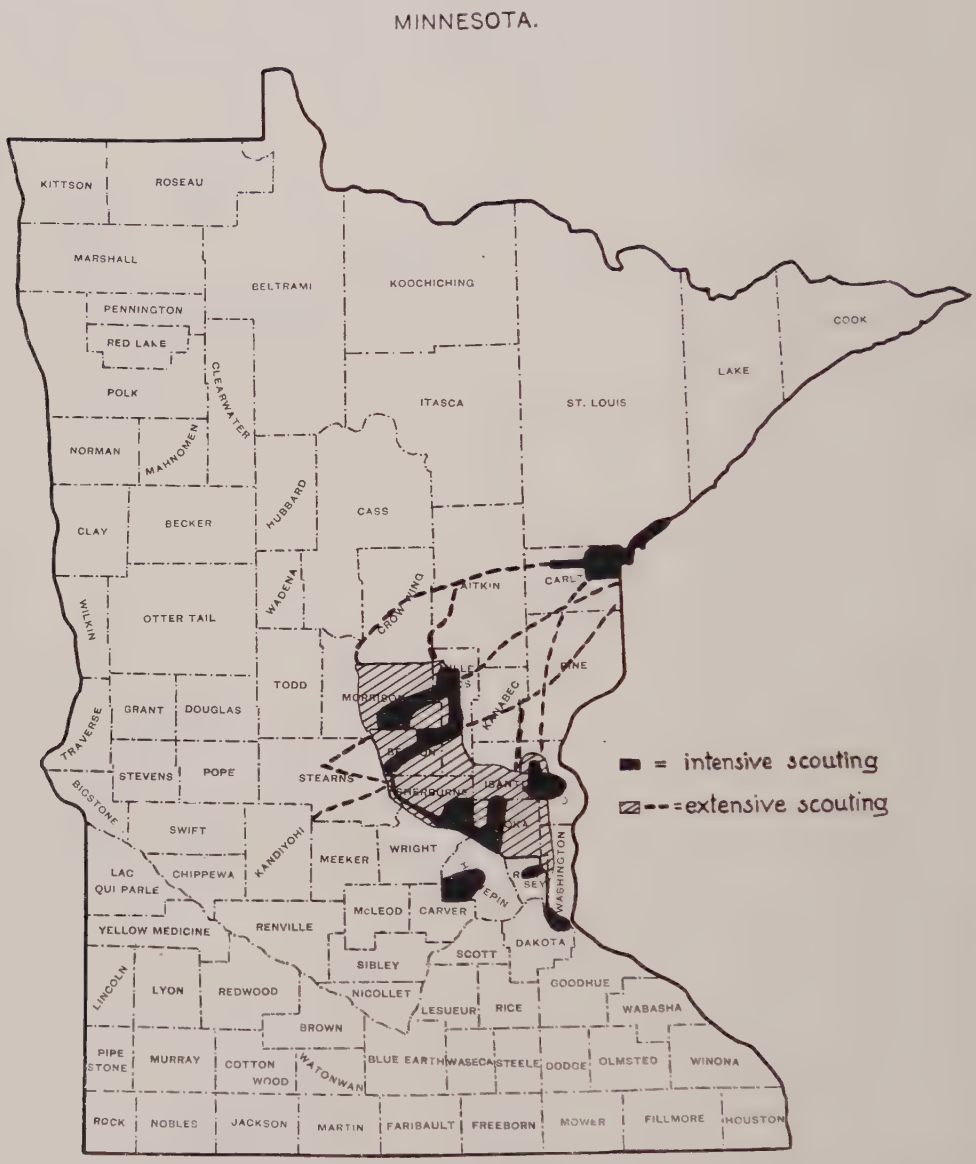


Fig. 6. Map showing in general the intensive and extensive scouting made by the Nursery Inspection Service under the direction of the State Entomologist, in an effort to locate the possible western and northern limit of the infected area.

that in practically every case we have appealed to the fair-mindedness and spirit of co-operation on the part of private owners of said stock in the matter of permitting destruction. In most cases we found citizens of sufficient public spirit to willingly do what was directed in this connection. In some cases owners refused to meet us in this particular and in such cases the provisions of the law may have to be made use of.

From the above it is evident that it was, and still is, the policy of State and Federal workers in Minnesota to destroy all trees in leads from infected nurseries whether the disease is apparent or not. Leads, however, which have been planted for several years, six or seven or more, and show no infection, although originally from an infected nursery, should not necessarily be destroyed.

Number of towns visited in the examination of nurseries for pine	149
Total pine plantings inspected	284
Number of pines found in plantings (approximately)	100,000
Number of time plantings were inspected:	
242 plantings were inspected once	
38 plantings were inspected twice	
4 plantings were inspected three times.	
Number of plantings destroyed	71
Number of pines destroyed (approximately)	6,500
Number of infections found on pines in leads and nurseries	8

SCOUTING BY INSPECTION FORCE.

The scouting by the Entomologist's deputies in 1916 along the St. Croix has already been referred to, page 1. In 1917 this scouting was continued outside of the original area designated as the St. Croix valley. About eleven men were employed at different times in this survey. The work can be classified under two heads—"Intensive scouting" and "Extensive scouting." Intensive scouting was accomplished in 1917 by deputies on foot, bicycle, motorcycle or with livery, the extensive scouting being done along the lines of railways and by automobile. **It was deemed of the utmost importance to discover, if possible, how far to the west or north the infection had spread from the infected area originally discovered along the St. Croix.** This constitutes an important feature of next year's work. We include statement of areas in which scouting by our deputies occurred outside of the originally infected area. This survey by the inspection force consisted in scouting around leads in or near pine territory and in pine regions bordering on the St. Croix district; in other words, between known infested areas and the big pine areas of the state.

There were two types of intensive scouting; (a) inspection of areas by sections and townships; (b) inspection of areas, containing white pine and Ribes irrespective of surveyed boundaries.

SCOUTING TABLE.

County	Number of men employed in County	No. of man days spent in County	First date of scouting in County	Last date of scouting in County
Aitkin	7	18	June 22	Aug. 24
Anoka	6	18	July 9	Sept. 6
Benton	4	18	June 21	Sept. 29
Carlton	8	89	Aug. 23	Sept. 28
Chisago	5	69	May 28	Sept. 11
Crow Wing	5	18	June 2	Aug. 23
Dakota	1	8	Aug. 6	Aug. 18
Freeborn	4	4	May 24	May 24
Isanti	7	56	Aug. 13	Sept. 10
Hennepin	5	52	May 4	Aug. 21
Kanabec	1	3	June 26	June 28
Millelacs	8	46	June 19	Sept. 28
Morrison	4	22	June 1	Sept. 29
Mower	2	6	Aug. 4	Aug. 11
Pine	3	12	June 13	Aug. 8
Ramsey	5	40	May 1	Aug. 4
St. Louis	3	38	May 29	Sept. 29
Sherburne	5	29	July 11	Sept. 15
Stearns	4	18	June 1	Sept. 29
Steele	2	30	June 16	Nov. 24
Wabasha	3	16	July 18	July 31
Washington	3	18	July 1	Aug. 6
Wright	3	10	May 11	Sept. 19

Every effort has been made to trace all of the shipments from or through the Illinois nursery apparently responsible for the original infection in Wisconsin, and it was supposed that a complete list had been obtained. We were astounded, therefore, to receive a letter from this firm in September, 1917, stating that they had found in their old records, invoice of a shipment of 30,000 white pine transplants to the Scott-Graff Lumber Company, Duluth, Minnesota, May 14, 1909. We immediately got in touch with the Scott-Graff Company and learned that they had planted 43,120 pines on Sections 26 and 27, W½ of SW¼, Township 56, Range 8, Cook County. Fearing that these trees, 30,000 of which came into Minnesota the same year the infected trees were sent to St. Croix Falls, Wisconsin, may have brought disease into our northern woods, deputies were immediately sent to the above locality near Lake Lax to make a thorough inspection of this planting. They found that partly through the agency of fire and rabbits these trees had been reduced to barely 5,000 and the inspection showed no evidence of rust.

During the season deputies from this office found that a few trees which originally came from Germany still remained in the state planting near Pillager, and these trees were inspected and destroyed by our force after the deciduous trees and shrubs had dropped their leaves, when the pines could be easily found. No evidence of disease was found upon these trees.

Fig. 7. Scouting for Blister Rust in white pine reproduction.

WORK IN THE ST. CROIX DISTRICT.

As stated before Dr. E. M. Freeman, Plant Pathologist, is responsible for all work this year in this region, and has successfully accomplished, with the aid of Mr. Bartelt in the field, a difficult piece of work. In assuming this portion of the work Dr. Freeman stipulated that in this area the work should be done exactly as he directed, and he has been given an absolutely free hand, although legally a deputy. All credit, therefore, and all responsibility for this part of the work rests with him. Most careful scouting has been done in this territory, the white pine blister rust localities being accurately mapped as well as the distribution of Ribes in the immediate vicinity of all pines. Blank township maps were supplied to guide the scout and to be used also for mapping and blister rust data. Most of the territory was covered on foot, although scouting was facilitated very often by use of bicycles, motorcycles, automobiles, teams, railways, electric car lines, canoes, launches and rowboats, the idea being to cover the ground in the process of scouting in the most efficient manner. Two camps (supplies and equipment purchased on State Funds), worked the territory about their respective camping sites. In addition individual scouts were assigned to work a distance from the camps, carrying with them for this work one tent for sleeping purposes, obtaining their board from near-by farms or hotels. In a few cases these scouts cooked their own meals. Washington, Chisago and Kanabec counties, as well as parts of Pine, Isanti, Millelacs, Aitkin and Carlton counties were covered in this survey. At Pine Hollow Creek, where blister rust was found in 1916, a camp was established May 1, 1917, with fourteen scouts and a cook. The State Forester's office estimated at this place there were approximately 10,000 board feet besides a goodly amount of sapling stock. This pine was immediately cut and closely inspected. On May 8th the first infection was found and a number were found at various dates after that. All pine here was cut by May 30th. Similar measures were employed at Dry Creek, although, there, lumberjacks were employed to do the cutting and the pine at the latter locality covered about 214 acres, representing about 150,000 board feet. One infected pine was found. Scouting was continued up and down the river. Infections found in this territory are given in the following table:

WHITE PINE BLISTER RUST INFECTIONS IN ST. CROIX DISTRICT, SEASON 1917

No.	County	Vicinity	Species infected	No. infected trees or bushes	Stage of infection	Date found	By whom found	Source of trees
1.	Chisago	Pine Hollow	P. strobus	1 pine	aecial	5-8	P. O. Anderson	Native
2.	Chisago	Dry Creek	P. strobus	1 pine	aecial	5-24	P. O. Anderson	Native
3.	Washington	Marine Mills	P. strobus	1 pine	pycnial	6-2	Aase.	Native
4.	Washington	Afton	P. strobus R. cynosbati R. aureum R. floridum R. gracile	100 or more 1000 or more	All stages uredo and telio	6-12	Newhall and Frudden	Native
5.	Chisago	Boom Creek	P. strobus R. cynosbati	1 pine 100 or more	aecial uredo and telio	6-13 7-25	B. Kienholz H. Bartelt	Native
6.	Chisago	Franconia	P. strobus R. cynosbati	20 bushes 1 pine	uredo and telio aecial	8-31 6-19	Pfaender Odland	Native
7.	Chisago	Harris	P. strobus	1 pine	aecial	7-2	Frolik	Native
8.	Chisago	Harris	P. strobus	1 pine	pycnial	7-10	Schmid	Native
9.	Pine	Rock Creek	P. strobus R. cynosbati	1 pine 50 or more	aecial uredo and telio	7-18	Frolik	Native
10.	Pine	Rock Creek	P. strobus	1 pine	pycnial	7-18	Pfaender	Native
11.	Pine	Pine City	P. strobus R. cynosbati	3 pines 50 bushes	aecial uredo and telio	7-19 7-19	Newhall	Native
12.	Kanabec	Braham	P. strobus	1 pine	pycnial	8-2	Frolik	Native
13.	Pine	Pokegama	P. strobus	1 pine	pycnial	8-3	Newhall	Native
14.	Isanti	Springvale	R. cynosbati	1 bush	uredo and telio	8-28	Arp	Native
15.	Chisago	Rush City	P. strobus R. cynosbati	2 pines 10 bushes	pycnial	9-1	Benton	Native
16.	Chisago	Rush Lake	P. strobus R. cynosbati	300 or more 500 or more	all stages uredo and telio	9-8	Frolik	Native
17.	Washington	Lake Elmo	P. strobus	2 pines	pycnial	9-22	Pfaender	Nurs.
18.	Chisago	Taylors Falls	R. cynosbati	25 bushes	uredo and telio	8-21	de Flon	Native

During the course of the work a most serious infection was found at Afton, south of the scouting operations of 1916. From June 12th to September 15th a crew of from three to eight laborers were working continuously at this point. This infection was so serious and the spread of the disease on Ribes so rapid that a change in method had to be adopted and work was confined to eradication on the outside limits of the infected area in an endeavor to check this spread in directions where other pines were in danger of infection. Summarizing the season's work in the St. Croix Valley: the scouting between May 15th and November 1st resulted in covering and mapping approximately 2,296 square miles of territory in the St. Croix Valley. This scouting reported 18 new infections of the Blister Rust, 10 of which are single pine infections; 2 quite large infected centers numbering 100 infected trees or more; 2 isolated **Ribes** infections, and the rest are pine infections of two or three trees. Out of the 10 single tree infections, seven were reported found and cut before fruiting could take place.

The eradication results of the season were very thorough and effective. After eradication in 1916, no more infections were reported in the vicinity of the infected nurseries. The Pine eradication at Dry Creek and Pine Hollow seemed to be very effective in stopping the disease from spreading, since no more has been reported from either area. The **Ribes** eradication at Afton covered approximately 600 acres, but the infection had obtained such a start before it was discovered that it was only possible to check the spread by the eradication. All single tree infections were cut and burned when found and in seven cases no **Ribes** infections followed. Only three pine infections are known to be in the state at present which are at all serious; namely, Afton, Rush Lake and Pine City. Where isolated **Ribes** bushes were found infected, these were pulled and burned by the scouts.

The infection at Rush Lake, calling for strenuous work next season, was perhaps the most serious of all. (See table.)

The success of the work in the St. Croix valley was largely due to excellent advice and direction given by Dr. Freeman to the field men.

OUTLOOK AND PLANS FOR THE COMING SEASON.

The condition in Minnesota is most critical. It is so regarded by all workers over the United States and by the Bureau of Plant Industry. Under conditions existing at present, and if the disease is not found next season in our large timber tracts in the north, it would appear that Minnesota has a fighting chance of keeping this disease restricted to the infested area as found in 1917, and possibly, after a number of years eradicating it for the time being in the state.

Manifestly a large amount of scouting will be necessary. The U. S. Bureau of Plant Industry through Mr. Pierce, the representative in charge of the work in this district, and through Dr. Metcalf, have promised generous

WHITE PINE BLISTER RUST ERADICATION, ST. CROIX DISTRICT, DURING SEASON 1917

No.	Vicinity	Eradication carried on by			Acres eradicated		Hrs. required for eradication by			Cost per Acre	
		Gov. Scouts	State laborers	Private Labor	Pines	Ribes	Gov. Scouts	State Labor	Private Labor	Pine	Ribes
1	Pine Hollow	13	1	....	100	4	2046	65	....	7.96	5.50
2	Dry Creek	....	15	....	214	....	....	3642	....	6.38	....
3	Marine Mills	....	....	3	....	5	....	....	144	....	7.20
4	Interstate Park, Taylors Falls	....	4	....	....	50	....	560	....	....	2.80
5	Afton	....	5	....	....	600	....	2702	....	....	1.11
6	Franconia	....	....	3	....	125	....	....	150	....	.22
7	Boom Creek	....	....	2	....	100	....	....	276	....	.69
8	North Branch	....	6	....	....	35	....	216	....	....	1.54
9	Rock Creek	4	....	....	....	2	40	....	....	....	1.25
10	Pine City	3	....	....	....	40	56	....	....	....	.35

Fig. 8. A portion of the cut-over area at Pine Hollow, work done under the direction of the Plant Pathologist of the Experiment Station.

Fig. 9. A portion of the cut-over area at Dry Creek. Work done under the direction of the Plant Pathologist of the Experiment Station.

Fig. 10. Another view of cut pine at Dry Creek.

co-operation. Dr. Metcalf has advised the Entomologist that in his estimation at least $18,000.00 of federal funds will be available for use in Minnesota during the coming season. Naturally, this is a forestry problem and calls for investigation and expert work on the part of a forester, for the question of lumbering and forest management is involved. Therefore, as is quite fitting, it has been thought best by authorities concerned, to include in the work for next year, the Head of the Division of Forestry of the Agricultural College, who would, with the Plant Pathologist of the Station and the State Entomologist, work under the State Entomologist's Law, that being the only statute at our disposal for this work at this time.

The State Entomologist has submitted to the Plant Pathologist and the Professor of Forestry, as mere suggestions to be considered, three different plans, intimating that any other division of work mutually satisfactory and bringing about most efficient results might be more desirable. The first of these plans is similar to what prevails in Wisconsin, in which case the Plant Pathologist acts in an advisory capacity over the entire work and yet is relieved of the many details connected therewith.

As stated elsewhere, these operations of the Entomologist, as well as regular Nursery Inspection, are classified as University work, representing authorized Experiment Station projects.

ACKNOWLEDGMENTS.

The State Entomologist has been intensely interested in this problem, which means so much to Minnesota, and wishes to again express his appreciation of the generous spirit of co-operation shown by the Governor of the State, by the State Forester and other state officials, by the United States Bureau of Plant Industry, and the interest and faithfulness of his Chief Deputy and workers under him. To Dr. Freeman's technical knowledge and efficiency in organization and to Mr. Bartelt's loyal co-operation, the progress made in the St. Croix district is entirely due. We are thoroughly appreciative of the assistance rendered by the legislature at its fortieth session.

FINANCIAL STATEMENT—STATE FUNDS

To November 1st, 1917.

Special appropriation for State Entomologist.....$7,500.00

	State Entomologist's Department	Plant Pathologist Department	Brought Forward
Traveling expenses and auto mileage (F. L. Washburn)	$22.61	.....	$22.61
Salary, expense and auto mileage of Chief Deputy Inspector	456.39	.....	456.39
Personal expenses of Plant Pathologist Mr. Bartelt, scouts and deputies	.....	951.41	951.41
Deputies' salaries	349.62	60.00	409.62
Deputies' traveling expense	1,257.60	.....	1,257.60
Laborers' salaries	.....	542.60	542.60
Cooks' salaries	.....	293.32	293.32
Groceries for camps	.....	544.27	544.27
Clerical help	202.31	.....	202.31
Office expenses	.....	512.26	512.26
Permanent equipment (office and field)	538.32	.....	538.32
Permanent equipment (camps, etc.)	.....	581.59	581.59
Printing (Report on Blister Rust, circulars, photos, news letters, etc.)	414.63	.....	414.63
Telegraph	23.55	.....	23.55
Postage	80.50	.....	80.50
Miscellaneous	.....	44.37	44.37
*Unused balance to date	89.47	535.18	624.65
	$3,435.00	$4,065.00	$7,500.00

*For contingents and for log skidding in the St. Croix Valley.

FINANCIAL STATEMENT—FEDERAL FUNDS

(U. S. Bureau of Plant Industry) To November 1st, 1917

	State Entomologist's Department	Plant Pathologist Department	Brought Forward
Deputies' salaries (includes field men)	$2,683.16	$6,882.63	$9,565.79
†Deputies' traveling expense	991.62	3,218.62	4,210.24
Temporary Labor	.....	771.60	771.60
	$3,674.78	$10,872.85	$14,547.63

†Subject to slight change.

Respectfully,

F. L. WASHBURN.

Pine twig, showing open blisters. Courtesy of R. G. Peirce, U. S. Bu. of Pl. Industry.